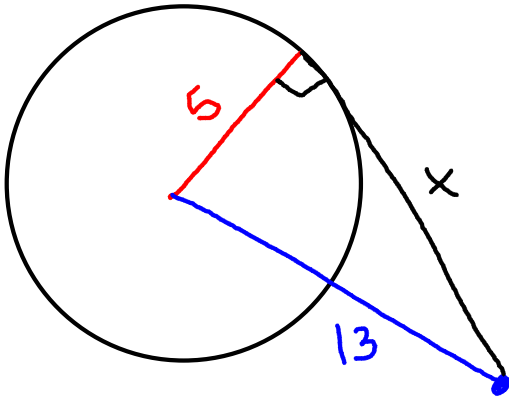


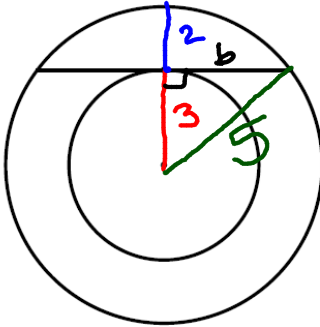
Worksheet 8.2: Tangents

1. A point is 13 cm. from the center of a circle whose radius is 5 cm. Find the length of the tangent segment from this point to the circle.



$$\begin{aligned} 5^2 + x^2 &= 13^2 \\ 25 + x^2 &= 169 \\ -25 \quad -25 \\ x^2 &= 144 \\ x &= 12 \end{aligned}$$

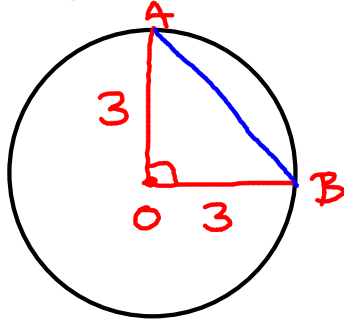
2. In the figure below the two concentric circles have radii of 3 and 5, respectively. Find the length of a chord of the larger circle which is tangent to the smaller circle.



$$\begin{aligned} 3^2 + b^2 &= 5^2 \\ 9 + b^2 &= 25 \\ b^2 &= 16 \\ b &= 4 \end{aligned}$$

8

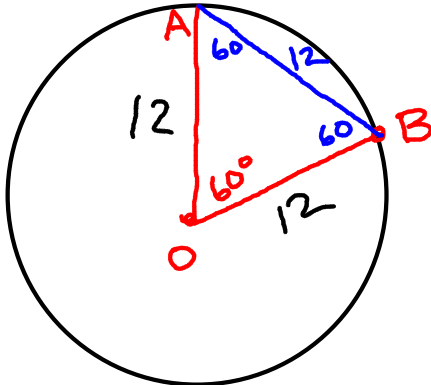
3. In $\odot O$, radius $\overline{OA} \perp \overline{OB}$. If $OA = 3$, find AB .



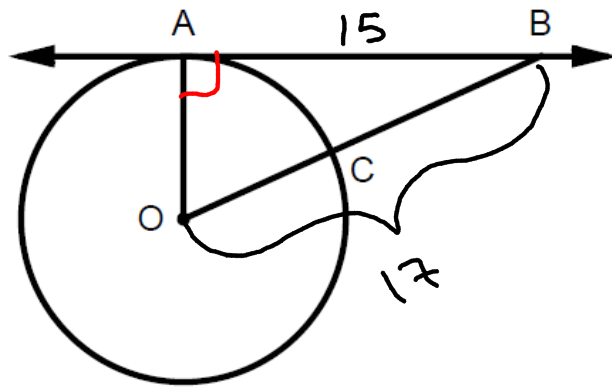
$$\begin{aligned}
 3^2 + 3^2 &= c^2 \\
 9 + 9 &= c^2 \\
 18 &= c^2 \\
 \sqrt{18} &= c = 3\sqrt{2} \approx 4.2
 \end{aligned}$$

$\begin{array}{c} \swarrow \quad \searrow \\ 2 \quad 9 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad \textcircled{3} \end{array}$

4. In $\odot O$, \overline{OA} and \overline{OB} are radii and $m\angle AOB = 60^\circ$. If $AB = 12$, find OA .



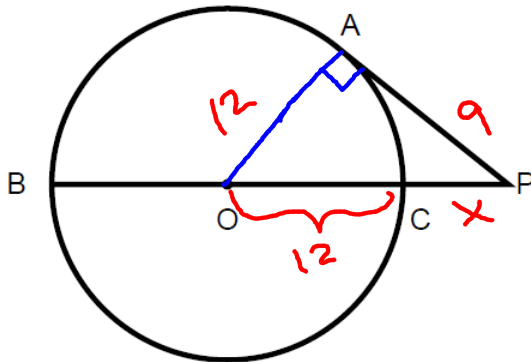
5. In the figure below, \overleftrightarrow{BA} is tangent to $\odot O$ at A. Radii \overline{OA} and \overline{OC} are drawn, and \overline{OC} is extended to intersect \overleftrightarrow{BA} at B.



$$\begin{aligned} a^2 + 15^2 &= 17^2 \\ a^2 + 225 &= 289 \\ -225 &\quad -225 \\ a^2 &= 64 \\ a &= 8 \end{aligned}$$

If $BA = 15$ and $OB = 17$, find the measure of a radius of $\odot O$.

Questions 6 and 7 refer to the figure below. Diameter \overline{BC} is extended to point P and tangent \overline{PA} is drawn.



6. If $OC = 6$ and $CP = 4$, find AP .

$$\begin{aligned} a^2 + 6^2 &= 10^2 & a^2 &= 64 \\ a^2 + 36 &= 100 & a &= 8 \end{aligned}$$

7. If $OC = 12$ and $AP = 9$, find PC .

$$\begin{aligned} 12^2 + 9^2 &= c^2 & 15 - 12 &= \textcircled{3} \\ 144 + 81 &= c^2 \\ 225 &= c^2 \\ 15 &= c \end{aligned}$$

8.

If $AD = 9$, $DB = 5$, find AC .

$$(5+x)(5+x) = 25 + 5x + 5x + x^2 = 25 + 10x + x^2$$

$$(9+x)(9+x) = 81 + 9x + 9x + x^2 = 81 + 18x + x^2$$

$$14^2 + (5+x)^2 = (9+x)^2$$

$$196 + 25 + 10x + x^2 = 81 + 18x + x^2$$

$$221 + 10x + \cancel{x^2} = 81 + 18x + \cancel{x^2}$$

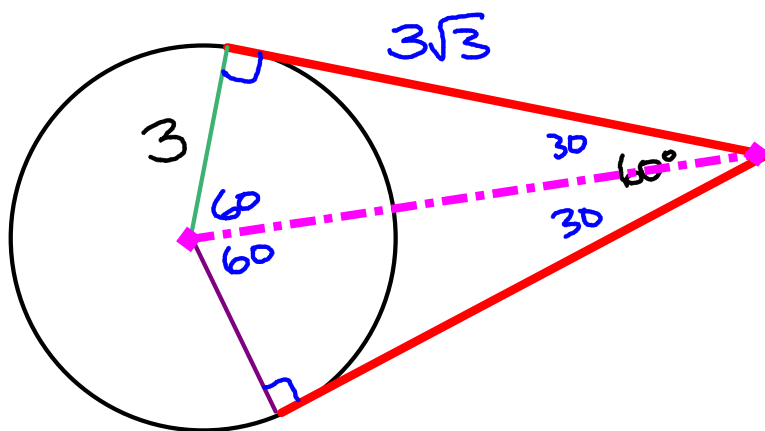
$$221 + 10x = 81 + 18x$$

$$\begin{array}{r} -81 \\ 140 + 10x = 18x \\ -10x \quad -10x \end{array}$$

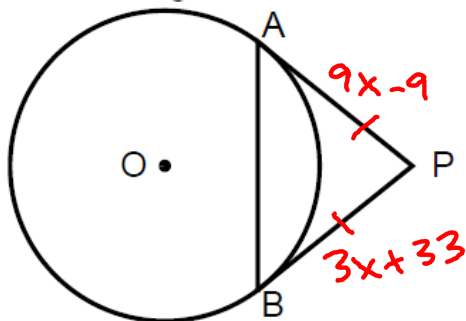
$$\frac{140}{8} = \frac{8x}{8}$$

$$17.5 = x$$

9. Two tangents to a circle form an angle of 60° . If the radius of the circle is 3, how long are the tangent segments in simplest radical form?



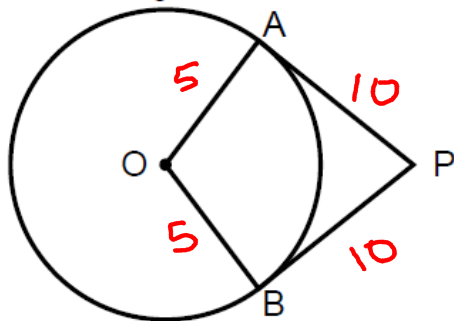
10. In the diagram below, \overline{PA} and \overline{PB} are tangents to $\odot O$ from P and chord \overline{AB} is drawn.



If $PA = 9x - 9$ and $PB = 3x + 33$, find x .

$$\begin{aligned}
 9x - 9 &= 3x + 33 \\
 +9 &\quad +9 \\
 9x &= 3x + 42 \\
 -3x &\quad -3x \\
 6x &= 42 \\
 \frac{6x}{6} &= \frac{42}{6} \\
 x &= 7
 \end{aligned}$$

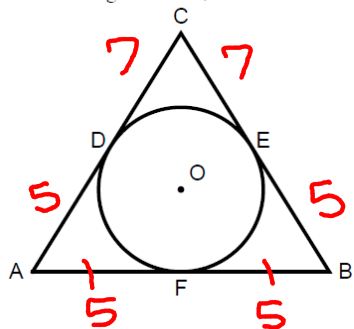
11. In the figure below, \overline{PA} and \overline{PB} are tangents to $\odot O$.



If $PA = 10$ and $OA = 5$, find the perimeter of quadrilateral $PAOB$.

30

12. In the figure below, $\odot O$ is inscribed in $\triangle ABC$ so that the circle is tangent to \overline{AB} at F, to \overline{BC} at E, and to \overline{AC} at D.



If $AF = FB = 5$ and $DC = 7$, find the perimeter of $\triangle ABC$.

34